



# UVic Forest Biology Update

Fall 2023

## Meet our Associate Member:

### Dr. Jon Degner



I am a research scientist with the BC Ministry of Forests, where I manage tree breeding and testing programs for coastal Douglas-fir and Sitka spruce. Every year, we plant 15-20 million coastal Douglas-fir seedlings in BC, and more than 99% of those are grown from seed produced in a managed seed orchard. My primary role as a tree breeder is to establish and monitor field trials that are used to select and evaluate the trees that go into those seed orchards. This breeding and testing program ensures that our seed orchards produce trees that grow well in a wide variety of environments and that are improved in traits of interest to foresters. Historically, that has meant breeding trees to grow large and fast, and to produce high-quality timber, but those priorities are rapidly shifting towards breeding for resilience to future climates and new forest pests. I am now working on breeding coastal Douglas-fir for resilience to drought and tolerance to Swiss needle cast, while trying to maintain the gains in growth that have been achieved by tree breeders over the last 60 years.

In addition to managing these tree breeding programs, I am involved in a wide variety of research projects with industry and academic partners, ranging from improving crop survey schemes to using landscape genomics to inform reforestation strategies. Through these collaborative research projects, I am starting to incorporate newer technologies into my tree breeding programs, including genomic selection, high-intensity phenotyping, and remote-sensing phenotyping approaches. Most of my collaborations are with researchers from Natural Resources Canada, UVic, and UBC. Within the CForB, I am presently working with Drs. Juergen Ehling and Paul de la Bastide on using genomic and field-based methods to identify Swiss needle cast tolerance within the coastal Douglas-fir breeding population.

I grew up in Southern Oregon and immigrated to Canada in 2010. I received my BSc and PhD from the Department of Forest and Conservation Sciences at UBC, where I studied under Drs. Sally Aitken and Loren Rieseberg. I presently live and work in the Lake Cowichan area, on the traditional territories of the Hul'qumi'num and Ditidaht speaking First Nations. I spend a lot of my spare time bushwhacking through the wilds of Vancouver Island, looking for big trees.

## Dr. Barbara Hawkins wins UVic Award for Teaching Excellence

For the past 33 years, Barbara has brought her undiminished enthusiasm for plant biology to undergraduate and graduate students and the wider community. Over the years, Barbara has taught 14 different courses on a variety of topics, including creating a new course in Tree Biology, creating a botany module for BIOL 248, designing two different graduate level courses, and spearheading the concentration in forest biology. Barbara often supplements her lectures and labs with optional field trips to local parks, research institutions and the Royal BC Museum. She is clearly loved by her students, who speak highly of her enthusiasm, passion, kindness, and commitment to student success.

## The 21<sup>st</sup> Annual International Conference on Polyphenols

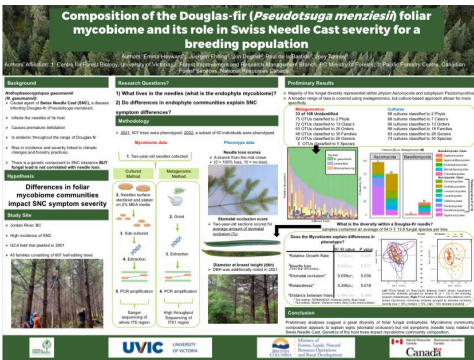
In July 2023 FORB faculty member Dr. Constabel attended the 21st International Conference on Polyphenols in Nantes, France and gave a talk on genome editing in poplar.



## Forest Genetics 2023 Gene Namkoong Award winner - FORB's Emma Hayward!

Big congrats to Emma Hayward (Ehltung Lab) on winning the Gene Namkoong Award for best Poster at the Forest Genetics 2023 conference!

There were great talks on tree genetics, pests & climate change strategies & even one on the genetic history of corn. Dr. von Aderkas also presented a talk at the Tree Seed Working Group. There were 2 field days of tours through some of the seed orchards, tree breeding populations & trials that they have going on for assisted migration & progeny testing.



## New FORB Members

David Shen	Dr. Ehltung	MSc
Michela Audisio	Dr. Hawkins	Visiting PhD
Kailey Strachan	Dr. von Aderkas	Honours Student
Iosif Mitiashin	Dr. Ehltung	Research Assistant
Freya Innes	Dr. Hawkins/ Dr. Lacourse	Honours Student
Em Creasy	Dr. von Aderkas/ Dr. Hawkins	Honours Student
Solène Boisclair-Joly	Dr. Hawkins	Directed Study
Kai Friele	Dr. Lacourse	Honours Student
Eve Kenny	Dr. de la Bastide	Research Assistant
Hannah Zumwalt	Dr. Ehltung	Research Assistant
Liberty Evans-Agnew	Dr. von Aderkas	Research Assistant
Olivia Osborne	Dr. von Aderkas	Research Assistant
Jadyn Anderson	Dr. von Aderkas	Lab Assistant
Mubarak Salim	Dr. Constabel	Research Assistant



## FORB Halloween 2023!

Bethany Robson wore her amazing mushroom costume and brightened the halls of Cunningham with her Halloween spirit!



## Recent Publications

Liu, Y., Ma, D., and Constabel, C.P. 2023. **CRISPR/Cas9 disruption of MYB134 and MYB115 in transgenic poplar leads to differential reduction of proanthocyanidin synthesis in roots and leaves.** *Plant and Cell Physiology*  
<https://doi.org/10.1093/pcp/pcad086>

McPolin, M.C., Kranabetter, J.M., Philpott, T.J., and Hawkins, B.J. 2023. **Sporocarp nutrition of ectomycorrhizal fungi indicates an important role for endemic species in a high productivity temperate rainforest.** *New Phytologist*.  
<https://doi.org/10.1111/nph.19280>

Kong, L., P. von Aderkas, J. Leblanc and C.H. Le. 2023. **Lodgepole pine cone production: new sites unleashed with GA4/7 and BA when used in a tree-sensitive manner.** *Tree Seed Working Group News Bulletin* 74: 6-12.  
[https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/tree-seed/tree-seed-centre/tswg-bulletins/tswg\\_news\\_bulletin\\_74.pdf](https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/forestry/tree-seed/tree-seed-centre/tswg-bulletins/tswg_news_bulletin_74.pdf)



## Ehltig Lab Update!

*Nothophaeocryptopus gaeumannii* is an ascomycete fungal pathogen of Douglas-fir and causal agent of a disease called Swiss Needle Cast (SNC). *N. gaeumannii* produces fruiting bodies in the stomata of Douglas-fir needles. These fruiting bodies block gas exchange and carbon assimilation, as a result, causing needle chlorosis and loss. At the whole tree level SNC symptoms lead to reduction in photosynthetic tissues and as a result a reduction in tree growth. This is of great concern to BC due to the economic importance of Douglas-fir in our forestry sector as well as being a keystone species. To make matters worse, climate change and forest management practices are favouring the spread and severity of this fungal pathogen starting to cause severe disease outbreaks in BC.



Branch showing SNC symptoms (dead/ chlorotic needles). Inset shows the fruiting bodies of SNC causing fungus *Nothophaeocryptopus gaeumannii* within the needles – these are what are causing the symptoms.



Branch collection for Swiss Needle Cast symptom severity scoring and isolation of fungal endophytes.



Collection of fungal endophytes isolated from Douglas-fir needles.

Recent studies suggest that the foliar microbiome may play a role in conferring resistance to such a disease. Our research is aimed at better describing the endophyte community within Douglas-fir needles and if these communities or specific endophytes can confer some form of resistance against SNC. This research is being done out of a Douglas-fir breeding population site in Jordan River, BC where we have been collecting data on Swiss Needle-Cast symptoms and on endophyte community composition. By using a breeding population, we can also determine whether mycobiome community composition is driven by host genotype.

Compiled by Andrea Roszmann,  
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